RURAL INDIA

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" Salvation of India lies in Cottages."

—*MAHATMA GANDHI*

ALTERNATIVE PARTY

THE need of a strong and well-organised alternative party to oppose and to replace the Congress is being felt by the people for over a decade and yet no party has so far succeeded to establish its claim of being a rival to the Congress. Obviously the reason is the absence of leadership superior in stature and calibre to that of Shri Nehru and the recognition of the party's capacity to provide clean and efficient administration by the people. A party before being voted to power must of necessity fulfil the two pre-requisites of outstanding leadership and the ability to provide honest and efficient administration.

The recent failure of the partisan and tyrannical Communist rule in Kerala has further frightened the people to repose their faith in the leadership of a party without testing its anticidents. All these factors have generated an atmosphere of scepticism in the country and it will be no easy job for a party to successfully challenge and to dethrone the Congress from the leadership of the country, however corrupt, demoralised and inefficient its rule may be.

Swatantra Party

It is claimed by no less a person than Shri Rajaji that the Swatantra Party was the only alternative to the Congress. While addressing a public meeting in Delhi, he is reported to have stated :—

"All I sought to achieve was to break this 'maya' that the Congress is the only party that can form a Government. I want the people to exert their minds.

" Delhi had seen many kings come and go, but unfortunately the party is not prepared to leave. That is why we need a strong, patriotic party. The Swatantra Party was the only alternative to the Congress. "

Of course, the leadership of Rajaji is the greatest asset of the Swatantra Party. In political foresight, clarity of thought and talent he has none to match him in the country.

But whether the Swatantra Party has better and higher patriotic human element in its composition as compared to the Congress and whether its organisational strength is such as to be able to provide alternative Government to the country are moot questions which are yet to be anwered by its leadership satisfactorily. And, apart from patriotism what the people need to be satisfied is, what guarantee is there that the drawbacks and defects, as pointed out by Shri Rajaji in his recent speech at Delhi, about the Congress rule may not be repeated by the rulers of the Swatantra Party when they come to power ? Some of the bad characteristics of the Congress rule, as stated by Rajaji are most harassing and hamper the growth of free life and enterprise. Says Rajaji :-

"His basic difference with the Congress was that the Government was interfering in every walk of life. Every trade and even transport were

subjected to pressures of one kind or the other. Besides, the extent of taxation was such that it had left the people a broken lot. Not only this but restrictions were being imposed on all sides. Corruption and partisanship were having free play."

Taking the present completely demoralised state of affairs of the country into consideration, it is beyond anybody's comprehension to find out human material of high moral calibre in any party who may be expected to root out corruption and partisanship prevailing in the country. With due difference to Rajaji and his new-born Swatantra Party, we have our serious doubts about the miraculous performance of the party to transform the present power hungry, selfish and hypocrite stuff into that of crusadors and patriots.

Basic Drawbacks

To a detached but sympathetic observer of the Swatantra Party the party seem to suffer from certain basic defects, which if not eliminated from the beginning, will make its chances of an alternative party to the Congress very remote if not impossible. We summarise our suggestions as we feel :

(a) Wrong selection and poor quality of Provincial leadership

The success of a political party, more than on anything else, depends on the idealism, purity of character, spirit of self-sacrifice and high moral and intellectual stature of its leadership. So far as our information goes the leadership of the Swatantra Party in the provincial sphere does not conform to some of these essential requisites needed in the leadership of a growing party.

A large majority of the present leadership of the party in the provincial sphere is composed of disgruntled Congress men, who have been either discarded or rejected by the Congress or who do not see chances of getting into power through the Congress. In the case of many, their record in the Congress has been one of selfseeking and opportunism. We doubt very much, if such an element which by and large constitutes organising leadership of the Swatantra Party in many states will ever be able to inspire faith and confidence among the people and attract large following.

(b) Absence of Clear-cut ideology

Swatantra Party, as conceived by its founder-leader, Shri Rajaji is a Conservative Party, which seeks to protect and preserve vested interests, monied and propertied classes from the effects of the totalitarian or communistic policies of the Congress. We have our doubts, if a strong and vigorous All-India Political Party to oppose the Congress could be organised merely on the basis of self-preservation, when the class interested in self-preservation is a hopelessly decadent class forming only a microscopic minority in the country.

(c) Absence of dynamic programme of Nation-building

An alternative party against the Congress has only chances of gathering strength and support on the basis of dynamic programme of nation-building where the Congress has proved an utter failure, and which also carries appeal to vast masses in a poor country like ours. How Swatantra Party is going to develop the nation morally, materially, administratively and educationally in the shortest possible time is a fundamental question which has not been satisfactorily answered by the leaders of the Party so far. The record of the Congress during the last 13 years in all these basic phases of nation-building has been most disappointing and the standards have registered precipitate fall in all these spheres. Public life is completely demoralised

and the moral basis of the society is ruined landing the people in the abyss of hopeless confusion and frustration.

The alternative party aspiring to rule or lead the people has to provide an answer to the moot question as to how it is going to rectify the wrongs done by the Congress rule. By its creative and constructive contribution, it has to satisfy public conscience that it has the *Will* and *Capacity* to undo the wrongs of the Congress rule and to build the nation on constructive foundations. Obviously, such a confidence among the people must take time and probably a long time.

INDIVIDUAL AND PLANNING

By: J. NARAYANAN

Planning

PLANNING is a social process by which a society or a nation as individual citizens or as representative individuals of groups, join together to determine social welfare needs, plan ways of meeting them, and mobilize the necessary resources. It is a process of bringing about and maintaining a progressively more effective adjustment between economic resources and social welfare needs.

Aims and objectives

The establishment of a new social order wherein there will be economic equality, a national minimum, a rise in the standard of living of the masses, full employment, elimination of exploitation, waste and corruption and narrowing down of disparities in income and wealth and to provide equality of opportunity for all, are some of the aims and objectives of economic planning. Through economic planning all the available resources are mobilized to achieve maximum efficiency in production and increased welfare and satisfaction to the nation as a whole even at the risk of dis-satisfaction to some individuals, groups or sections of the community.

Significance and importance of the individual

To the sociologists the term individual is a biopsychological conception. According to Charles Horton Coolley "A separate individual is an abstraction unknown to experience and so likewise is society when regarded as something apart from individuals". On the other-hand some other eminent men in this field like Herbert Spencer, Benjamin Kidd and Bernard Bosanquet speak as if the end or purpose of society are something other and bigger than the end or purpose of its members, as if the value consists in something else than their value. They suggest that the welfare of society can be attained apart from the welfare of its members. But in reality society exists only in its members, or in a stricter sense, society is the structure of relationships which its members build. So if we pursue any social ideal, say social or economic planning, which means anything else than the good of the social individuals we are pursuing a figment. Individuals are not external things, like the couplings which join railway carriages. The individual is the only real unit of society, and the worth of society is just the personality which the individuals realize.

Economic planning is the means of the realization of a welfare state. The planners have laid down social welfare as the end of the planning. The ultimate

objective of planning cannot be attained without the welfare of the individuals, who are the constituent members of the society.

According to Charles Sumner, "The true greatness of nations is in those qualities which constitute the greatness of the individuals." John Stuart Mill is of the opinion that "the worth of the State in the long run is in the worth of the individuals composing it." So the true significance and importance of individuals in a nation's plan, might seem needless reiteration.

According to Louck economic planning is intended "for the purpose of achieving certain nationally conceived and socially comprehensive goals". Individuals who are the constituent members of the nation are the persons who are competent enough to conceive the socially comprehensive goals. So the relationship between the individual and the plan is so intimate and intricate that we cannot see it separately one from the other. Only because of this fact Richard C. Fuller once noted that social and economic planning however good, "can be successful only to the degree that it is suited to the general temperament of the individuals and consistent with the fundamental cultural attitudes of the individuals of the group which it seeks to control".

Group Creation–An Illusion

All inventions come from individuals, whether it be a word, an institutional detail, or a mechanical device, it originates as an individual expression. At this juncture one may well put the question how can one say that planning is the creation of the individual when we know that it is a decision of a determinate authority which involves the participation of more than one person? To this and similar other questions the answer is, firstly the idea originates from individuals which they express in the group. Several of these ideas are heard and a consensus of opinion is formed and then it is shaped into a group decision. So originally it is the invention of individuals. The illusion that they are group creations is due to the short interval of time between the invention and the group use.

Individual to be Convinced

In the impersonal, anonymous and competitive culture which dominates our lives today, however, the individual has been forgotten. We give lip-service to his importance in voluminous books and political speeches but in practice, the devil has not been getting its due. We call our plan as people's plan and postulate three main reasons for the same. Firstly, it is intended for the benefit of the individual, secondly it is discussed and represented by individual and thirdly individuals' help is needed in implementing the plan.

But it is seen only in the book. If it were really so an active and broad citizen participation must be seen. In democratic planning the enthusiasm and initiative must come from the individuals and from the village level. The essence of democratic planning is the increased and harmonious development of the initiative and resourcefulness of the people. So the Indian plan hinges for its success, by and large, on the people's co-operation.

In India nearly 84 percent of the people are groaning in ignorance, illiteracy and indifference to environment due to poverty. So to achieve a broad citizen participation, it is the duty of the planners to inform the citizens about the purposes and goals of the plan and the people should be made aware of the social needs as seen by the professionals in the field. Here one must recognize that mere build-

ing of roads and dams by 'Shramdan', mere organization of Planning Forums on the University or State Levels or publication of pamphlets and books and showing some film-strips in urban areas are good but not enough.

As our people are ignorant and illiterate they raise the question what material benefit they derived from huge Five-Year Plans. They also begin to say, "Oh! What are all these. These are all criminal waste of public money. The net result will be absolute zero." There are some politicians and political parties which seem to find a masochistic delight in criticism and they flay about at their fellow men with sadistic disregard for truth. These cricicisms confirm the idea of our ignorant masses.

So the planners have to give a psychological satisfaction, that he is an individual in this huge planning that is going on around him and he is building up in his own humble way a progressive state. To this, effective and efficient functioning of community projects, village panchayats and co-operative societies is the first pre-requisite. To give the psychological satisfaction, any mammoth show in one place in the country is not enough, but in every village and town something must be done. For example good recreational centres can be opened (either by the panchayats or the community projects) wherein men, women, and children might seek spiritual comfort, that is food for the body, heart and mind. In this way the plan must convince the coming generation that the individuals of tomorrow will be Haves and Haves and Haves and there shall be no Have-Nots.

Individual freedom

Some think that planning will reduce individual freedom. But, how far freedom and planning are compatible depends purely on our notions of freedom and the character of planning. Ours being a democratic planning, there is the least possibility of the curtailment of the individual freedom. Right always goes with responsibility. Individual has got both rights and duties. It is his duty to co-operate with the planners in the implementation and in making the plan a success. So also the plan must have been so devised as to help the individuals immediately and effectively.

Here one must note that the contribution of one single individual—however important he may seem to himself or to his contemporaries—is of relatively little consequence in itself. So one individual cannot in any major way fashion the plan to his personal ideas of what it should be like. On the other hand it must be the summation of the endeavours of countless individuals. Therefore all the individuals of the present, operating in terms of all that was derived from the past, must build the society of the future.

Here one must note the essential difference between individual and individualism. There is a harmonious relationship between individual and the plan but that is not so with individualism and the plan. While individual is an essential ingredient for the plan, individualism is to be curbed out from our planned economy.

Conclusion

As we are striving to attain a socialistic pattern of society, our first and foremost duty must be to curb this trend of individualism. At the same time the importance of individuals in the society must also be recognized. For this problem a humanistic approach alone will not suffice but a scientific approach is essentially and immediately needed.

In this direction it is the sociologists who can help the planners. So the sociologists must also occupy key positions in the National Planning Commission. Then there is a tremendous possibility of the success of the Indian plan and we will be big in our achievements but not big in our failures.

FOOD PROBLEM

By: VISHNU SHARAN AGARWALA

INCREASING agricultural production is essential for feeding the increasing population of the country, for the health and efficiency of the vast masses of the population who live on subsistence level, for providing raw materials to the expanding industries, for securing exportable surpluses and for creating conditions for appreciable increase in the standard of living of the bulk of the Indian population. This shall be the largest single factor in holdidg the price line and keeping the inflationary pressures in check. The attainment of self sufficiency in food should be a desirable aim for every country, but it assumes particular significance for an underdeveloped country like India which is making serious efforts for the economic uplift of the people. In fact, self-sufficiency in agricultural production shall be the decisive factor in the success of our plans for economic progress. The battle of Indian economic development shall be fought on the front of agricultural production, and particularly food production.

That there is considerable scope for stepping up agricultural production is clearly brought out by the fact that concentrated efforts in limited areas have doubled and even trebled the production.

For the solution of the food problem of the country, it must be emphasised that more than anything else, our efforts should be concentrated on the following :

1. Get the most out of the area already under the plough.
2. Save what you produce, and
3. Utilise local resources.

The former category shall include measures like supply of improved seeds, implements, manures, fertilisers, improved agricultural practices, assured water supply and soil conservation etc.

The second will comprise of measures for protection of standing crops in the fields and of foodgrains in storage against stray animals, plant diseases, insects, pests and dampness.

It appears that the imagination of our planners is swayed by the idea of organising something big like big multi-purpose river valley projects and giant fertiliser factories, rather than by small, simple and inexpensive measures which can bring immediate and lasting benefits, probably because such measures call upon vast resources of organising capacity and skill touching the wide agricultural horizon of the country.

What inexpensive and seemingly little methods can do is illustrated by the fact that in China spectacular rise in crop yields has been secured due to deep ploughing alone.

Improved strains of seed and manures can raise crop yields appreciably. But establishment of seed multiplication farms has registered only slow progress. As against the target of about 4,000 seed

farms to be set up during the second five year plan period, more than 2,700 seed farms had been established till 1959-60, i. e., the fourth year of the second plan, out of which over 2,400 farms started producing improved seeds, but how far actual benefits were realised from them would need further investigation. The utilisation of local manurial resources, has been lamentably lacking. Truck loads of town refuse is daily dumped into depressions only to pollute the air which would have otherwise blossomed into golden corn, if composted.

Similarly the stress should be on the full utilisation of resources already created. Creation of irrigation potential without simultaneously initiating the agriculturists into the art and science of utilisation of water is a sheer wastage of national resources developed at enormous cost. As against the irrigation potential of 5.98 million acres created by the major and medium irrigation projects by March 1958, actual utilisation amounted to 4.8 million acres or 80% of the potential created. These figures show considerable improvement in the situation over the previous year.

In the process of switch over from dry farming to wet farming, the farmers have to be instructed in the use of water and convinced of its contribution in raising the crop yields. Experiments on the change in farm practices that shall be necessitated on account of the availability of water should begin atleast five years before. It is of the utmost importance that all preparations for the reception of water in the fields and their proper use should be completed well in advance of the flow of life giving waters. Emphasis should be on minor irrigation works which yield quick results, require comparatively smaller outlay, enable the use of local resources and generate people's participation. Thus they possess all the basic potentialities necessary from the point of view of quick increase in production. Ford Foundation Team had to say that India can make greater and more immediate gains in food production by better water management than by constructing large scale irrigation projects which take years to develop.

In China, small irrigation works (the basic concept of a small work is that it can be completed with local materials and manpower) constitute the backbone of irrigation system which is supplemented by the large works. The main contribution in the expansion and utilisation of irrigation facilities has been the construction of channels that convey water to the farthest fields. An interesting feature is that the silt cleared from tanks, ponds and channels is taken over long distances in the fiields if necessary, a measure which has helped to conserve the fertility of the Chinese soil over ages. The economical use of water is ensured through the preparation of fields before they are actually irrigated. Moreover, good progress in this direction has been achieved by the maximum utilisation of local resources.

Another aspect of the problem is to preserve the land already under the plough. Soil erosion, water logging and salinity are the cancers that are either continuously reducing the fertility of soil or rendering it unfit for cultivation. March of the Rajasthan desert is encroaching upon 50 sq. miles of land every year. According to Mayadas no less than 123 million acres of land in India are being eroded or exhausted on account of primitive methods of farming. 23 lakh acres in Uttar Pradesh and 30 lakh acres in Punjab are affected by the appearance of salt on the surface. The

problem of water logging is most acute in Punjab where such area (water table 0–5 feet deep) is 19.71 lakh acres. It has been estimated that the loss of foodgrains on account of water logging and salt amounts to as much as 6·31 lakh tons annually in Punjab.

Enormous quantities of food grains are wasted on account of unscientific storage of food grains. Not only the farmers and traders, but also the housewife should be instructed in methods which shall reduce wastage to the minimum. It will be of interest to note that two million tons of foodgrains are wasted in storage alone while total imports of food grains during 1959-60 amounted to 3.8 million tons. Prevention of this loss alone will cut down the imports by half. Besides, enormous damage is caused to crops and plantations in India by pests and diseases. Estimates of such damage vary from 10 to 20 percent of the total crop produce, the cash value of which may go upto about Rs. 1,000 crores annually. Damage done by termites alone is well over Rs. 28 crores. Crops have also got to be protected from the depredations caused by wild and stray animals, elephants, blue bulls, wild boars, jackals, foxes, birds and parrots.

This is not to reduce the importance of other measures and incentives which can substantially contribute to the augmentation of food production and strengthen the base of agrarian economy viz., assured, timely and adequate availability of credit and supplies, marketing facilities, remunerative price level, consolidation of land holdings, making the tiller the master of his field, co-operative farming. Our food problem is not insoluble. That it has defied solution all these years should be attributable to the lack of concerted drive, initiative, vigour and action.

In the end it must be stressed that the problem of stepping up agricultural production can be resolved if the existing resources could be harnessed effectively and administrative deficiencies removed. It is largely a problem of administration, because the ways and means of achieving the objective are well-known. What matters is their application. No Allauddin's wonder lamp is required to remedy the situation. It is only human effort that is wanted.

FOOD AND THE THIRD PLAN

By: Prof. R. G. SONY

FOOD has been described as the Achille's Heel of the Indian economy. And rightly too; for in spite of its predominantly agrarian basis, the economy of our country has since long suffered from food shortages.

We cannot deny the fact that though India is basically an agricultural country and the bulk of her population is engaged in agricultural pursuits, still agriculture in India is a 'depressed industry' because the relative income in agricultural sector is far less than those in the non-agricultural sectors. The total produce of the land is too small to provide a decent living to the entire agricultural population.

I think it will be safe to say that per acre production in India is the lowest in the world. Paddy, wheat, maize, practically in all cereals, our production is the lowest—lower than even Pakistan's. Our average production per acre in paddy is only 1200 Lbs. as against 3750 of Japan and 2387 of China. In wheat it is only 640 Lbs. as against between 1000 Lbs. to 2000 Lbs. in most countries. Similar is the case of other cereals. So any improvement in the food situation can be effected only by increasing the productivity of our lands; and in that respect up till now we have not been able to do much.

Secondly, per capita availability of agricultural land in India is 97 cents only, while in U. S. A. it is 7.41 acres, U. S. S. R. 4. 48 acres and even Europe as a whole, it is 1.52 acres. So it becomes all the more necessary to increase the productivity of land. There is no reason why we cannot raise productivity of land, if we take to proper methods. Japan has definitely shown us the way in this direction. There is immense scope for intensive cultivation in India. While in India 59 percent of the holdings are less than 5 acres in size, in Japan 95 percent are less than 5 acres and more than 40 percent less than 1¼ acres in size and yet the yield of paddy is 48.1 quintals which is much more as compared to India, U. S. A. and even China.

Now the Union Food Ministry has almost decided to set the target of food production for the country in the Third Plan at 110 million tons with outlay of Rs. 1092 crores. It is recognised by one and all that we must step up food production considering the faster growth of population. In 1951 our population was placed at 357 million and by 1956 it was estimated that the population had risen to 385 million. Our demographers expect that if the current trend persists the population will reach the astounding figure of 410 million by the time next census is held in 1961.

It is estimated that at the end of the Third plan India's population would swell upto 480 million and nothing short of 110 million tons of food would be needed to feed them. Since independence India has spent more than Rs. 1500 crores of her valuable foreign exchange for the foodgrains imported during the period. It will be easily realised what benefits would have accrued had the need to spend such a large sum of money been obviated. So Food Ministry has rightly taken the decision of achieving self-sufficiency in food.

There is no doubt that this can be done if efforts are made in right direction. The Ford Foundation Team has

observed that the best in Indian agriculture is comparable to the best in other countries and the task before the country is to develop ways of raising low average to the higher levels that many Indian cultivators have achieved. The Ford Foundation has been collaborating in launching the 'package deal' for intensive cultivation in selected areas. The package deal which is now being launched in seven selected districts and is to be further extended to 25 districts in various parts of the country will ultimately bring 18 million acres under intensive cultivation. The new programme aims at doubling the yield per acre. It is hoped that this scheme will yield spectacular results if supply of improved types of implements, fertilisers and improved seeds is assured.

During the war days the alien Government had imposed restrictions on the switch over of food crop yield to cash crops. Now that the food situation portends almost an emergency the Government would do well to impose such restrictions. A bold policy in which food zones and other fads of the Government find no place would tend to stabilize food prices.

Shri S. K. Patil our food minister has admitted the other day that the farmer is the most neglected man in the country.

If he is given proper incentive and a place of dignity in our social and economic order, there is no doubt that he will make his contribution towards our fight against poverty and hunger.

And last but not the least while long-term measures for increasing the production of staple food crops continue, attempts should also be made for imposing a check on our rapidly increasing numbers. As Ashoka Mehta Committee's Report says : "For an effective solution of the food problem, not only determined and all-out efforts to step up production have to be made, but the high rate of increase of population has to be checked. We, therefore, urge that a nation-wide campaign for family planning enlisting the efforts and energies of social workers particularly women, medical men, scientists, economists, administrators and political leaders be launched." Unless this be done, all our endeavours in the direction of making India self-sufficient in food would prove futile.

CO-OPERATION—THE HOPE OF RURAL INDIA

By : HUKAM SINGH CHAHL

A Co-operative may be defined as an organisation which is set up by the people voluntarily to do something which can not be done individually by them and the motive behind it is self-help rather than profit. It provides a mechanism with the help of which development works larger than those which are within the reach of an individual can be accomplished easily and with lesser expenditure. It is an agency through which self-help becomes most feasible. It is an institution which fully exploits the social instinct of man, teaches people to depend on nobody but make self-help their motto, and raise their living standards higher through the medium of this time tested agency.

Co-operation generally stands for making the best of a bad situation and it is an instrument quite handy to

conquer the backwardness by utilizing the energies of hundreds of persons. That this instrument can change living standards is not a debatable point now and the effectiveness of this weapon has now been established all the world over. It has now been proved that Co-operatives with the necessary resources and passionate community spirit have worked wonders in the most trying circumstances.

India lives in villages. More than 82% of its 36 crores live in over five and a half lakh villages. 73% of the 36 crores are engaged in agriculture which is our national key industry and a national occupation. But our agriculture is far from efficient. We do not produce ¼th per acre as compared to U.S.A. Our cow gives 1/20 th milk of a cow in Nether-Lands. Our producer is half-fed and half-clad and we have to stand before other nations with a beggar's bowl every year. This is awful. We cannot simply sit over it and meditate. We shall have to grow more to become surplus. We shall have to feed our cow to the extent of getting 20 times more milk. In this context we intend to take the help of this time honoured agency-Co-operation.

To improve agriculture we shall have to strike at all the allied ailments simultaneously and grow more. To save us from disease we shall lay emphasis on preventive methods and provide curative medicines. To raise our moral standards we shall revive our village councils. We have to fight the triple enemy of rural India—Hunger, Disease, Ignorance. Our Co-operatives shall thus play an economic, social and educative role.

Economic role

The economic improvements cover a very wide field.

1. Rural income shall be increased through co-operative farming and co-operative marketing societies.

2. To eradicate rural un-employment and under-employment, cottage industries on co-operative basis shall play a vital role.

3. Land shall be reclaimed and irrigated.

4. The competition of rural credit co-operatives shall force the village money lender to reduce his interest rate substantially or be wiped out of the village economy. Credit will become cheap and abundant, and shall be used for productive purposes only.

5. Live stock shall be improved through pure and fine specimen of breeding stock kept by village co-operatives.

6. Supplies and services shall be delivered at cost price and the surplus of income over expenditure shall be distributed as dividends.

Social role

The social instinct of man shall be exploited to the extent that disorganisation and friction of village life shall be replaced by mutuality and the will to work together.

2. Idleness and drunkenness shall vanish. The legislative measures of prohibition shall need no longer be necessary.

3. Moral standards will be raised, fair dealings will be the motto.

4. Sense of equality will prevail. The rigid caste system shall give way.

Educative role

Co-operation shall put general education on practical footing. The people shall learn business methods and democratic procedure. This will be

the birth of a new and high rural civilisation.

But some people doubt the success of the steps to be taken on the above lines and they also just feel that the things are being forced on people. They should not however entertain such fears because nothing is to be forced upon them and for the success of the anticipated steps, the experiments in other countries stand witness. Nothing more is to be done than arousing the enthusiasm of the people. The social instinct of man is to be exploited, group consciousness is to be aroused, passionate community spirit is to be awakened. The associations shall be totally voluntary. Neither entry will be forced nor exit barred. These institutions shall be of the people, by the people, for the people. They will associate themselves together as human beings on the basis of equality.

This all however will not happen by itself or by a magic wand. The government shall have to come forward to take the initiative, to assist and guide and then withdraw itself slowly at a later stage. The experience in all corners of the world has shown that people with capital and community spirit can build civilization in deserts with the help of co-operatives. Co-operatives of William Raiffeisen in Germany is an un-paralleled example in history. Not a single dollar was lost of the millions of dollars put into circulation. It rescued the German farmers from the clutches of usurers and made them their own bankers and merchants. Denmark is a fine example of rural civilization based on Co-operatives. The co-operative livestock insurance of France is commendable and similarly the co-operative crop insurance of Argentina. Co-operative housing is decidedly an important part of American life. It is said that 1/3rd of all irrigation in U. S. A. is under co-operative arrangement. The co-operatives of U. S. S. R. in which women have played a leading role are worth praising.

The experience in Canada has shown that co-operatives have done which the benevolent Governments could not do.

India too celebrated the golden jubillee of co-operation in 1954, but the results are not very encouraging though that is due to some reasons since the alien rulers never made passionate efforts in this direction.

Now when we have thrown the alien yoke away, we shall make progress with a fantastic speed. A place of pride has been given to co-operatives in the national five year plans and C. D. programmes.

Starting with Service Co-operatives, we will march ahead developing this march into an avalanche, we shall establish tiny co-operative Commonwealths in the entire network of our 5,50,000 villages, fulfilling the aspirations and high hopes of rural India which is no doubt aching for progress. On the contrary however if Co-operation fails, there will fail the high hope of rural India.

PLACE OF PHOSPHORUS AMONG THE FERTILISERS

By : A. K. B. CAZI

Phosphorus, the Master Key to Agriculture

1. Nitrogen, phosphorus and potassium, shortly referred to as NPK, are the three primary elements of fertilisers. Among these, nitrogen is generally given the first rank because it gives initially the quickest and most pronounced effect on plant growth, and, in fact, nitrogen starvation of plants is more quickly recognised than phosphorus starvation. However, its beneficial effect is restricted to only one crop to which it is directly applied. Phosphorus on the other hand, continues to give its beneficial effect to several crops in succession and in addition to this the soil to which it is applied often improves in structure and general level of productivity. Phosphorus also improves the quality of plant produce. From economic point of view, bulk alone is not the only item of gain to the farmer but quality and other factors also have to be taken into account while assessing the benefits to be derived from the use of fertilisers.

Phosphorus has sometimes been called the "Master Key to Agriculture." Its importance in general farming is indicated by the fact that low crop production is due more often to a lack of phosphorus than to the lack of any other element. It is a limiting plant food on about 80% of Indian soils and now scientists recommend that crops must have balanced fertilisers.

The following further scrutiny of data obtained by various research workers will give comprehensive picture of the beneficial effect of phosphate application on the crop.

Comparison of responses from phosphrous and nitrogen.

2. Below table shows the summarised report of Simple Fertiliser Trials on cultivators' fields (1953-54 to 1955-58) for All India conducted by U. S. Technical Co-operation Mission to India (Source: Summary report by R. H. Engle)

Table I

Fertiliser treatment lbs. per acre.	Yield per acre lbs.	Increase in yield per acre lbs.	Profits on Fertilisers investment. %	No. of experiments.
Rice				
Untreated plot	1712	—	—	2672
20N	2072	360	194	1586
40N	2240	528	117	780
$20P_2O_5$	2000	288	374	860
$20N+20P_2O_5$	2240	528	188	1784
$40N+20P_2O_5$	2414	702	130	965
$20N+40P_2O_5$	2406	694	185	674
Wheat (Irrigated)				
Untreated plot	1144	—	—	2130
20N	1400	256	214	1230
40N	1536	392	140	846
$20P_2O_5$	1320	176	334	666
$20N+20P_2O_5$	1496	352	188	1238
$40N+20P_2O_5$	1608	464	128	776
$20N+40P_2O_5$	1568	424	160	389

Cost of 20 lbs of N = Rs. 15.3

Cost of 20 lbs of P_2O_5 = Rs. 12·7 (60% superphosphate charged 1st year)

Paddy sold at Rs. 10/-per maund.

Wheat sold at Rs. 15/-per maund.

From the data shown in the above summary report, it is possible to evaluate the comparative responses of N and $P(P_2O_5)$ as shown below.

Table II

Evaluation of responses-Comparison of N with P_2O_5.

Fertiliser treatment lbs per acre.	Increases in yield per acre. lbs.	Increase in yield per lb. of fertiliser lbs.	Percentage agregate increase of response of P_2O_5 over N
(1)	(2)	(3)	(4)
RICE 20N	360	18.0	
$20P_2O_5$ (60% basis)	288	14.4	
$20P_2O_5$ (100% basis)	480*	24.0	33
WHEAT (irrigated)			
20N	256	12.8	
$20P_2O_5$ (60% basis)	176	8.8	
$20P_2O_5$ (100% basis)	293*	14.7	13

* Total increase on two crops.

The above calculations are based on the presumption of T. C. M. research worker that no nitrogen is carried over for the use of the next crop whereas P_2O_5 is carried over for the benefit of the next crop to the extent of 40%.

The above calculations show that when agregate responses of N and P_2O_5 are compared for two consecutive years, the latter gave 33% more increase in rice and 13% more increase in irrigated wheat, when the quantity of each fertiliser applied separately was 20 lbs per acre.

When P_2O_5 applied in combination with N even in the first year's crop its response per lb. was equal to the response per lb. of N in the case of rice and almost so in the case of irrigated wheat as could be judged from the figures given in coln. 5 in table III below.

Fertiliser treatment lbs per acre N	P	Total Fertiliser NP	Increase in yield per acre lbs	Increase per lbs of fertiliser. lbs.
Rice.				
40	—	40	528	13.2
20	20	40	528	13.2
40	20	60	702	11.7
20	40	60	694	11.6
Wheat (irrigated)				
40	—	40	392	9.8
20	20	40	352	8.8
40	20	60	464	7.7
20	40	60	424	7.1

It may be noted that while P_2O_5 gives equal or almost equal response as compared to the equal quantity of N when applied in combination with the latter, it will still continue to give further responses to the succeeding crops. Such is not the case with nitrogen as shown by the experiments of various workers. The data obtained of these research workers give interesting results when analysed further and discussed at length in each of the two following cases.

Case No. 1–Residual effect of phosphate application to hay crop

3. Experiments conducted by Rothamsted staff in different parts of Great Britain shows the exact extent of residual effect of single dressing of phosphate fertilisers given in 1930–1 and the same carried further in succeeding years as measured in terms of quantity as well as quality of herbage. Some of these are set out in table below.

Table IV.

Northallerton hay experiment, 1931–4 (source E. I. Russel) Yield of dry hay, cwt. per acre.

Year	Without phosphate	Low soluable slag.	Gasfa mineral phosphate	High soluable slag.	Superphosphate	Standard error.
1931	24.3	29.5	33.6	36.4	37.8	0.79
1932	12.8	15.2	18.6	19.3	18.7	0.43
1933	14.6	18.2	21.0	21.3	19.9	0.44
1934	9.5	12.0	14.0	14.3	13.2	0.16
Mean	15.3	18.7	21.8	22.8	22.4	
Nitrogen as percentage of dry hay						
1931	1.32	1.36	1.55	1.58	1.59	0.032
1932	1.56	1.68	1.82	1.81	1.89	0.063
1933	1.28	1.40	1.51	1.45	1.49	0.028
1934	1.24	1.32	1.34	1.36	1.36	0.022

The above table shows that both yield as well as nitrogen contents of the hay increase as a result of application of phosphates applied in different forms and that increases were sustained during subsequent years. Taking all the four types of phosphates into consideration the average increase per acre per year have been 10.0, 6.2, 5.5 & 3.9 cwts respectively in each succeeding years. If only the first two years response is taken into consideration ignoring the responses of the succeeding years beyond two years then 60% response was in the first year and 40% in the 2nd year.

Superphosphate is the most effective form of phosphate fertilisers and is also in common use. The effect of its application on the total increase of hay per acre as well as percentage of increases during different years following its application may be further analysed as under.

Table V

Year	Increase of hay per acre over untreated plot. cwt	Percentage increase of hay.
(1)	(2)	(3)
1931	13·5	55·4
1932	5·9	46·1
1933	5·3	36·3
1934	3·7	39·0

The trend of percentage increases definitely indicates that residual effect of superphosphate will be carried over for still further number of years, before percentage increase in hay comes to stay at no increase level.

The following table shows the effect of single application of superphosphate on the improvement of the quality of hay and how this improvement has been maintained from year to year as indicated by the percentage increase of proteins.

Table VI

Year	Quantity of protein per acre (yield × percentage N ÷ 16) Without superphosphate Cwt	With super-phosphate Cwt	Additional protein per acre. (Difference between coln 2 & 3 Cwt	Percentage increase of protein with superphosphate over no super-phosphate.
(1)	(2)	(3)	(4)	(5)
1931	2.05	3.76	1.71	83
1932	1.25	2.21	0.96	77
1933	1.17	1.85	0.68	58
1934	0.74	1.12	0.34	52

The last column in the above table indicates the trend in percentage increase of protein which is an index of increase of quality of hay. The improvement of quality is even better than the increase of the quantity of hay (C/F last column in table V).

Quantities of nitrogen added per acre per year were 31, 17, 12 & 6 lbs in each succeeding year respectively.

It is a well known fact that by application of available calcium phosphate as is found in superphosphate, the content of lime as well as that of phosphate of herbage is increased. Now the findings of Rothamsted workers show that even protein contents are stepped up very high even though no nitrogenous fertilisers were used in the experiments. The increase of protein content may

partly be due to more efficient utilisation of nitrogen of the soil and also partly due to the fixation of atmospheric nitrogen by free living bacteria and those living in symbiotic relation with leguminous crops such as clover which forms one of the constituents of herbage, since calcium phosphates have special action on all types of bacteria that fix nitrogen. It has long since been recognised that easily soluble phosphate facilitates or hastens a change of nodule organism which enables it to move about in soil, and so increases the chance of its getting into the roots of clover or other legumes and forming nodules necessary for good growth.

Experiments carried in France showed that a mixture of organic substances and calcium phosphate when incorporated in the soil can build up soil fertility permanently by fixing atmospheric nitrogen and supplying available phosphates,potash, trace elements, humus and maintaining soil neutrality.

It may be stated that in plants, proteins, vitamins and minerals, like calcium, phosphorus and iron are generally found associated together. Furthermore, there exists a co-relation between fibre and protein and there is also similar relation between fibre and starch equivalents. The relation is somewhat like this; for every pound of increase in fibre, there is approximately decrease of one-half pound of soluble carbohydrates, one-third pound in protein and one-sixth in ether extract. Thus for every one-third pound increase in protein the fibre contents go down by about one pound and vice versa. Again for decrease of every pound of fibre, the starch equivalent go up by 1.64 lbs. or vice versa (source A. K. B. Cazi).

Thus application of superphosphate which raises the protein contents also automatically raise the starch equivalent of herbage. Knowing the approximate relation that exists between protein, fibre and starch equivalent, it is possible to get rough estimate of the increase in starch equivalent per 100 lbs of hay by the application of superphosphate in the above experiment at Rothamsted as under.

Table VII.

Year	Protein percentage in dry hay (Nx6.25) without superphosphate.	Protein percentage in dry hay (Nx6.25) with superphosphate.	Increase of protein per 100 lbs of dry hay.	Decrease of fibre in 100 lbs of hay (fig. in colmn 4 multiplied by 0.3)	Increase in starch equivalent in 100 lbs of dry hay. (col 5 × 1.64
(1)	(2)	(3)	(4)	(5)	(6)
1931	8.25	9.94	1.69	5.07	8.31
1932	9.75	11.81	2.06	6.18	10.14
1933	8.00	9.31	1.31	3.93	6.45
1934	7.75	8.50	0.75	2.25	3.69

Increase in starch equivalent gives the idea of the net useful or productive value of hay and it is also a comprehensive measure which combines both quantity and quality in one figure.

In order to evaluate the economic benefit derived from the application of superphosphate to the crop of hay, it is necessary to compare the yields in terms of starch equivalents (S. E.) rather than in term of quantities of hay, since S. E. express the net productive value of hay and are directly related to the results on animals consuming hay. For

example (a) 2.5 lbs S. E. go to produce one gallon of milk, or (b) 5 to 6 lbs. S. Es are required as a maintenance ration for a cow or a bullock depending on size, or (c) about one lb. S. E. is required to furnish enough calories for an average sized bullock to perform one hours' work of medium type.

S. Es of hays as produced on English farms vary from 20 lbs in the case of poor hay to 40 lbs. in the case of very good hay per 100 lbs. Reckoning starch equivalent of the Rothamsted hay obtained from plots not receiving the application of superphosphate at 30 lbs per 100 lbs. of hay, the following table will give almost true picture of compara tive yields of S. Es. per acre when superphosphate is applied and when it is not applied.

Table VII

Year	Without superphosphate		With Superphos phate.		Increase of S.Es by the applica-tion of superphos-phate per acre. lbs	Percentage increase of S. Es with superphosphate over no super-phosphate.
	Yield of hay per acre. lbs	S. E. per acre. lbs	Yield of hay per acre. lbs	S. E per acre lbs		
1931	2722	817	4234	1622	805	99
1932	1434	430	2094	841	411	96
1933	1635	491	2229	812	321	65
1934	1064	319	1478	498	179	56

When comparison is made between the increase of S.E. (vide col 7) and increase of hay (vide col 3 table V) it will be noticed that the percentage rise of S. Es. is higher than that of hay.

New Zealand, a country of large scale dairy farming exporting milk products to oversea countries consumes approximately 360 lbs. of P_2O_5 per acre of arable land.

The farmers of the countries which produce large quantities of milk know very well that production value of herbage is enhanced by the application of phosphatic fertilisers. Belgium and Netherland where an average type of cow yields per annum over 5000 lbs. consume on an average 90 lbs. of $P_2 O_5$ per acre of arable land. In comparison to these countries, India consumes only 0.08 lbs. of $P_2 O_5$ and the average annual milk from her milch animal is only 400 lbs., being the lowest in the world.

In the United Kingdom farmers apply 2½ to 3½ cwt. of superphosphate per acre per annum to their grass lands as a routine practice and often no other fertiliser is given, yet the quantity of herbage as well as its quality is well maintained. One of the best and surest methods to increase the milk yield in our milch animals and to promote good muscles and bones in our work bullocks and other live-stock is to apply superphosphate liberally to all our fodder crops including grass lands and pastures.

The fact that the effect of phosphatic fertilisers lasts for several years goes to indicate that the application of phosphates helps bring about permanent improvement in the productivity of the soil as is also corroborated by the observations made by Rothamsted workers that (a) practically the whole of the superphosphate added to

Rothamsteed soils during the past 70 years, and not taken up by the crop, still remains in the soil, (b) reaction remains unchanged from year to year, and (c) there was no bad effect on the texture of the soil but on the contrary it frequently caused an improvement. Indeed one of the functions of superphosphate is to encourage the roots to multiply more profusely resulting in the formation of more humus when older roots decay and this will naturally cause improvement in soil structure and also in soil productivity.

Case No. 2—Residual effect of phosphate application to paddy crop.

4. As reported by Vaidyanathan (1933) on swampy land at Hmawbi farm when 95 lbs. of P_2O_5 were applied to an acre of paddy crop in the form of basic slag, the residual effect lasted for at least seven years as shown in the following table :—

Table IX

Statement showing the residual effect of basic slag

Years	1924	1925	1926	1927	1928	1929	1930	1931.
Mean yield of paddy per Acre lbs.	1872	1816	1067	1640	1213	1373	1305	1135.
Percentage increase over no manure	32.4	22.9	26.3	15.4	18.3	20.0	7.3	7.5.

The above results show that application of phosphates have long sustaining effect as fertilisers. To put it in the words of G. K. Corke "If phosphate fertilisers are used to maintain soil phosphorus reserves their residual effects are of as great importance as their immediate effects."

Phosphorus and balanced fertiliser

5. Phosphorus has been called the back bone of fertiliser industry, since from the very beginning of the industry the consumption of phosphate has far exceeded that of either nitrogen or potash. The present world ratio of NPK consumption is 1:1.2: 0.95. In India, however, the ratio is very much unbalanced being 1:0.09: 0.08. No doubt, India stands, at the present moment, on the lowest rung of the ladder of fertiliser consumption. But as we rise up in accordance with the targets fixed, the right adjustment in the ratio is expected to take place in its own sequence. According to the target of consumption fixed under 5 year plan, along with improvement of consumption of fertilisers, the ratio of NPK will also improve attaining the level of 1: 0.5: 0.15, at the end of 1965.

Bombay Government had already made a beginning of distributing manure mixture with a balanced ratio of about 1:1 of NP to the cultivators as long back as 1943-44. In their current schemes of intensive cultivation of various crops, the Govt. of Bombay have taken the right step of linking superphosphate with nitrogenous fertilisers well realising that phosphorus is a limiting plant food on about 80% of Indian soils. The need for linking P_2O_5 with nitrogenous fertilisers is all the more keenly felt because our bulky manures which are the main source of supplying plant nutrients to our soils are deficient in phosphoric acid.

On an average, compost contains per ton 22 lbs. N and almost equal amount of potash but only 13 lbs. of P_2O_3. This means that in accordance with the "law

of the minimum" 9 lbs. of N and 9 lbs. of K_2O being in excess over P_2O_5 are not available to the plants. In Bombay state compost is prepared in the neighbourhood of 30 lakh tons. If these 30 lakh tons of compost are re-inforced with superphosphate to bring the plant nutrients into balance, a huge quantity of 270 lakh lbs. of N and an equal quantity of K_2O can be recovered and made available for plant use.

6. In short, phosphorus, the master key to Agriculture and the back bone of fertiliser industry should always be included as one of the essential fertilisers to be linked up with bulky manures as well as with nitrogenous fertilisers. While phosphatic fertilisers can be depended upon to give beneficial results when applied singly without adversely affecting texture and re-acton of the soil, nitrogenous fertilisers applied without being supplemented with superphosphate would have to be used with great care and caution to avoid any risk of damage to the soil as well as to the crop. Inclusion of superphosphate is also essential on considerations that it generally improves the nutritive as well as keeping quality of plant produce.

WHY AND HOW TO APPLY MANURES AND FERTILISERS PROFITABLY

By: V. S. CHAUHAN

THE total cultivated land in Indian Union is 32,40,00,000 acres while the population of India is near about 40 crores. It means that every Indian has less than one acre of cultivated land in his share, for his food, fibre, and fodder requirements. From this we have to produce food and fibre for people and fodder for our livestocks. But the situation becomes more serious when we consider about our growing population, the rate of increase of which according to Shri. K. R. Damle (Secretary to the Govt. of India, Ministry of Food and Agriculture, in his talk on 29th August, 1959 at Asoka Hotel, New Delhi) at present is very nearly 1.9% per annum. In this way he opined that at the next census in 1961, this country may have a population of about 420 Million people. He further said that assuming that the population continues to grow at the same rate during the next quinquennium we may have to feed and clothe 480 million people in this country, as there is nothing yet to suggest that this trend in growth will either be arrested or reversed at the end of 3rd Five Year Plan period.[1]

Thus it becomes essential for us to try our best to make full use of all the resources available to the maximum to make our soil highly fertile so that we may adequately feed the crop plants, which will then supply adequate food and fibre for men, and fodder for their animals. This can be achieved either by extensive or by intensive farming. But in India land is scarce, so, the only alternative for us is to have intensive farming, which requires the utilisation of every inch of land in every season to the maximum.

Intensive farming includes several items like the use of improved seed,

1 Fertiliser News SEPTEMBER 1959.

irrigation, fertilisers, plant protection measures, use of improved implements and machinery, and improved agriculture practices. But from a long time growing crops have been removing from soils plant food in buckets while comparatively the Indian farmer is replacing the plant food with a few droplets only.[2]

Under normal conditions out of all the above mentioned items, the single item which can produce large increses in yield per unit of material put in is the use of fertilisers in association with irrigation. In this connection it will not be out of place to mention following remarks of the present Food and Agriculture Minister, Shri S. K. Patil in Rajya Sabha, "I can tell you that the land is the hardest mistress to please. It is not something that you can monkey with or toy with. I do not know whether it is animate or inanimate but you have got to respect the land and you have got to feed it"[3] (with plant food).

He has further remarked, "As one who firmly belives that the food problem in India can be solved by increasing agricultural production, I attach great importance to the role of fertilisers in raising soil productivity."

With the above remarks Shri Patil has stressed the use of fertilisers for raising the crop yields. Similarly results of several experiments conducted by I. C. A. R. independently as well as in collaboration with various private organisations and institutions throughout India, under variable conditions of irrigation and soil climatic factors for different agricultural commodities have also shown that production can be raised manifold provided the soils are supplied with adequate amount of plant nutrients.[4]

2 Fertiliser For *MORE* Food 1958. F. A. I Publication.

"3 (Fertilizer news September 1959.)

4 (Co-ordination of agriculture research vol 1 Section A 1956 Published By I. C. A. R.)

From the last decade farmers have also realised the importance of manures and fertilizers for raising crop yields. Though they have become fertilizer minded, still many of them are not well conversant with different methods of fertilizer applications. If best results are to be obtained the fertilizers and maunres should be applied efficiently, at the right time and in the right way, so that losses are at the minimum from the fields, and optimum increase in crop yields are obtained. Following are the methods in which they can be applied in the soil :-

(1) *Broadcasting* :—In this manure or fertiliser is spread over the entire surface of the soil by hand, and later on worked into the soil with hoes, harrows, cultivators, or ploughs. It is advisable to traverse the field first lengthwise and then breadthwise when broadcasting, to ensure even distribution of the manure on the entire field. Special general manures which are to be used in large quantities are generally used by this method so that relatively heavy application can be made. It is done before sowing, and during the preparation of land. Farmyard manure, compost and Mahua cake may be applied by this method about 6 to 8 weeks earlier to sowing while fertilizers like Superphoshate and oilcakes except Mahua cake may be applied 2 to 4 weeks before sowing. It is one of the best methods for Indian conditions where nitrogen is generally deficient and heavy applications are made to maintain high fertility for intensive crop production.

(2) *Top dressing* :—As crop plants do not take all the plant nutrients during their growth, so it is not desirable to apply all the needed fertilizer before sowing or planting but withhold part of the fertilizer for using it later on in the season in the growing crop. This

delayed application of fertilizer to the soil is called top dressing. This is generally done in cereals, vegetables, root crops, spices and fibre crops. Precaution should be taken that fertilizers are not applied in dewy morning or when the leaves are wet otherwise plant leaves will be scorched. Scorching is greater with nitrogenous and potash fertilizers than with phosphatic fertilizers. Top dressing may be done in the following ways :—

(a) *Spot dressing of band placement* : is the top dressing applied in a circle around the plant or seed 2 to 4 inches away from it and about 1 to 2 inches in the soil. This is good for those crop plants which are highly susceptible to be toxic by fertilizers on direct contact.

(b) *Side dressing or side placement* :- when top dressing is done in a growing crop in rows or hills along one side or in furrows near the rows opened with a hoe or any cultivating implement.

(c) *Broadcast top dressing* :—is the top dresing by broadcasting the manure or fertilizer in the growing plants. This is generally done in lawns, pastures, and grassfields. Loss of plant food or nutriants is minimum in this, because it is done generally at such time when the plants are big enough to absorb the nutrients readily. As far as possible top dressing should be done in a dry day, and care should be taken that fertilizers do not touch leaves, stalks, and other tender parts of the plants. It is better to incorporate the fertilizer by hoe or any other locally prevalent cultivating implement when it is applied in rows. Fertilizers like Superphosphate, Ammoniun sulphate, Sodium nitrate, and manures like compost, Farmyard manure etc. may be easily used in this way. It is better to mix some soil or sand with the fertilizer before applying it in the field to have easy and uniform distribution.

Plough Sole Placement:—In this method fertilizers are placed in a continuous band in the bottom of the furrow during the ploughing and each band is covered as the next furrow is turned. This is very common in U. S. A. in those regions where surface soil becomes dry during growing season. This can also be adopted in India where such conditions are prevalent. By placing the fertilizer in deeper layers in the moist soil it is readily available to plants during dry season through roots. There are less chances of Phosphorus and Potash fixation by this method, and greater quantity of fertilizers are used efficiently.

(4) *Drill Placement* :—In this method fertilizer or fertilizer mixture can be placed together with seed in narrow rows through a specially attached tube with the local plough or through drills specially attached for this purpose. The spouts through which seeds and fertilizer are distributed are ordinarily 9″ to 1 ft. or more according to the crop. Drills are so fitted that seed is placed at a depth of about 2″ and fertilizer at a depth of 4 inches, so that the fertilizer has no adverse effect on the germination and is readily available to the growing plants.

(5) *Starter Application* :— It is very common practice in U. S. A. and other foreign countries, and in India too, it can be used with success, as it is a safe, cheap and easier method of fertilization. It helps to establish a good stand, stimulates early root growth and results in early maturity. In this method a weak solution of manures or fertilizers is prepared with water at the rate of 1 to 2 tea-spoonfuls of chemical starters like Ammonium sulphate, Ammonium phos-

phate, Ammonium sulphate nitrate, Potassium nitrate, Ammonium potassium phosphate etc. per bucketful of water and 10 to 12 pounds (5 to 6 Seers of desi starters like fresh dung with 8 to 10 gallons of water and it is allowed to ferment for 2 to 3 days before application. Starter applications are done around the root zone and slightly away from the stem of the seedling just after transplanting. According to the Experiments conducted at Agriculture Institute Naini (Allahabad) and reported by Shri K. N. Shrivastava (in ALLAHABAD FARMER Vol xxxii No. 3 May 1959) it was found that plants getting manures and fertilizers through starter application were superior in all respects to control plots as can be seen from the following results :—

Observation	Control Plants	Plants getting Desi Starter	Plants getting Chemical starter.
1. Mortality in transplanting	9.5%	3.1%	2.08%
2. Recovered after transplanting	2 weeks	one week	one week
3. Flowered in	53 days	46 days	46 days
4. Yield per plant	688.40 gms	1155.6 gms	1260.1 gms.

To have high yields fertilizers and manures should be applied as far as possible by this method.

(6) *Coating seed with manures and fertilizers* :—In this method seeds are moistened with, or soaked, or immersed, in the solution of manures or fertilizers prepared with water, or they are coated with mixture of starch paste and manure. According to Gusev (1938) about 70 to 80% of phosphate was utilized in this method and striking increases in yields were found. In M. P. Dr R. J. Kalamkar has shown an increase of 13 to 15% in cotton yields by pretreatment of cotton seed with Ammonium sulphate. (Current Science vol. xii May 1942). Wherever possible this method of fertilization should be used for taking high yields.

Many farmers though use complete fertilizers and apply the correct amounts of plant nutrients per acre but even then they fail to get the results that should be expected because the method of fertilizer application does not place the fertilizers in the soil where best absorption by plants can take place. To have best results in yields, fertilizers and manures may be used with success by the above methods, modified according to the crop and the locality, provided they are applied at the right time, according to the nature of the manure and the crop in the following ways :—

Nitrogenous manures :-(a) Less soluble organic nitrogenous manures like Compost, farm yard manure, and oil cakes etc. which are applied in large quantities should be applied 4 to 8 weeks before sowing or planting, so that they may be decomposed well and are available to plants.

(b) Readily soluble and inorganic nitrogenous fertilizers should be applied in the crops when the plants are capable to use them. It is preferable to apply them just before rain is expected or immediately before irrigating the crop, so that they may be readily available to the growing crop plants.

Phosphatic Manures :—(a) the soluble phosphates should be applied about

1 to 2 weeks before planting or in the growing plants when they are few inches high.

(b) The less soluble forms like rock phosphate, bone meal etc. should be applied 4 to 6 weeks before sowing or planting so that they may be rendered soluble for ready assimilation by the plants when they are in need of it.

Potassic Fertilizers :—They should be applied and incorporated in the soil sometimes before planting or sowing, so that potash may be dissolved in the soil and available to plants when required.

It has been found that instead o single fertilizer application, mixed fertilizers or fertilizer mixtures containing more than one plant nutrient is beneficial. Fertilizer mixtures which are scientifically compounded to meet the known requirements of particular crops and soils are a simple and fool proof way of ensuring balanced fertilization. (Fertilizer News September 1959). So, as far as possible mixed fertilizers or fertilizer mixtures should be used according to crops and soils.

I am sure that if the above methods of fertilization of various crops are followed by farmers and progressive cultivators, our yields per acre will be higher than what they are today, and we will be able to feed our population which (According to Mr. H. Davenport, Director of Employment Exchange Govt. of India, "*Hindustan Times*" October 23, 1959) is growing at the rate of 13,700 per day, and we will have not to depend on the import of food grains from other countries.

INCOME AND EXPENDITURE PATTERN IN SOME RURAL AREAS OF RAJASTHAN

By : Dr. DOOL SINGH

I

Introductory

AN intensive study was completed recently by the author on "Wealth and Welfare of Shekhawati".[1] 'Shekhawati' is an old historical name for the area that is now included in Sikar and Jhunjhunu Districts of Rajasthan State. For the purpose of this study, the area of these two districts was divided into three natural regions, namely, North-West Desert, Central Plains and Submontane Region. As the statistics on family living studies were not available, we had to collect a large heap of data during the course of our intensive door-to-door survey in the seven villages selected on stratified random sampling basis. It will be interesting to examine the results of this study so far as they relate to the income and expenditure pattern of the people.

For this purpose, we have taken 'family' as the economic unit. The earnings of every worker in the family as well as the income from the family property such as land, livestock, etc., flow into the family pool for its maintenance. Women and even little children in the farm families contribute to the family income, either as earners or as helpers. Out of the total family pool, each individual gets a share according to his or her

1. This is the title of the unpublished Ph. D. thesis of the author.

needs but not according to their individual contribution, since the old and decrepit have also to be provided for from the total family earnings. That being so, the standard of economic condition in general and that of income in particular has to be assessed by the earning capacity of the family as a unit.

II

Income Pattern

During the enquiry, data on the income of each individual earner in the family from different sources were collected, and then the sources of income were grouped as under :—

(a) Cultivation of land,

(b) Animal husbandry,

(c) Agricultural Labour,

(d) Other Services, and

(e) Miscellaneous Sources.

The detailed figures regarding the income of 358 families are given in the appendix. The following table will, however, be found useful in studying the income pattern of the region under study :—

Statement showing income pattern in 7 Villages
(Annual Income per family in Rs.)

Source of Income	North-West Desert	Central Plains	Submontane Region	Total
1. Culivation of Land (Gross)	545.3 (51.5)	385.3 (66.4)	376.7 (67.4)	403.0 (63.7)
2. Animal Husbandry	91.2 (8.7)	54.4 (9.4)	103.4 (18.5)	72.9 (11.5)
3. Agricultural Labour	19.7 (1.9)	12.9 (2.2)	24.9 (4.5)	17.2 (2.8)
4. Other Services	66.4 (6.3)	83.7 (14.4)	23.7 (4.5)	64.6 (10.1)
5. Miscellaneous Sources	333.2 (31.4)	44.1 (7.6)	31.7 (5.8)	76.9 (12.1)
Total	1,055.8	580.4	560.4	634.6

Note: Figures in brackets denote percentages to total income of the family in the respective area.

The average annual income for all the families works out to about Rs. 635 per family. This is much less as compared to the level of income in the other States. In the absence of comparable data, it is difficult to have an exact idea of the disparity. The Agricultural Labour Enquiry found that the average income of a farm labour family in the North-West Population zone (in which Rajasthan and other neighbouring States are included) was Rs. 651[2]. Though the number of farm labour families in our sample villages was extremely small, namely 28 only, the average income of all families is less than even the average for the workers' families for the North-West zone.

The income per family is highest in the North-West Desert while the lowest level is found in the Submontane region. The higher income in the former region is attributable partly to the inclusion of an income of Rs. 6,000 from trade in respect of two farm families residing in Sarupsar Village. It is also explained by comparatively higher income from land and miscellaneous sources.

2. Figure taken from Agricultural Labour Enquiry Report, Vol. I, p. 298.

Again, amongst the villages, the highest income is recorded in Sarupsar and lowest in Tonkchhilri, as is apparent from the figures in the relevant table in the Appendix. However, it must be noted that our study of the whole problem has landed us into a kind of paradox. Though the soils, rainfall, existing facilities for irrigation and the like are found to be better as one proceeds from North-West to South-East, the actual economic condition of the farmers (as revealed by the foregoing table) deteriorates progressively in the eastern portions, particularly in the submontane region.

The paradox is partly explained by the small size of holdings and poor capital resources of the farmers in the eastern parts due to excessive rack-renting by the erstwhile petty Jagirdars. Again, the farmers in North-Western portions supplement their income by trade, camel and bullock rearing, etc. to a larger extent than in the eastern parts, as will be evident from the subsequent paragraphs. Moreover, the very fact that the North-West portion is a desert, impels the inhabitants there to exert more, so much so that at times considerable income is also brought in by them from casual work and other sources outside the region under study.

Income from Cultivation of Land

Of a total income of Rs. 635 per family, Rs. 403, i. e., about 64 per cent, is derived from cultivation of land. The proportion of income from this source to the total income of each family increases as one proceeds from North-west to South-east, though in absolute terms (actual income figures) reverse is the case. Thus, the per family income from this source is Rs. 545.3 in North-west Desert while the corresponding figures for Central Plains and Submontane region are Rs. 385.3 and Rs. 376.7 respectively. As there are large variations in the average sizes of holdings and families, the relation of income to land, as shown by the following table will be a better index of the efficiency of cultivation and productivity of land :—

Statement Showing Income from Land in 7 Villages

Villages	Land Holding in Bighas	Total income from land Rs.	Income per Bigha Rs.
Basghasiramka	489	8,328	17.0
Sarupsar	967	16,211	16.8
Sigri	1,618	15,610	9.7
Mohanpur	1,389	31,979	23.0
Khanpur	2,092	34,096	16.3
Tonkchhilri	1,250	21,939	17.6
Dhani Gumansinghki	706	16,107	23.0
All villages	8,511	1,44,270	17.0

It is evident from the above table that the highest income of Rs. 23 per Bigha is recorded at Mohanpur and Dhanigumansinghki. This is explained partly by better quality of soils and good rainfall at these places. In Dhanigumansinghki, the income is higher mainly due to considerable area under double cropping. The overall average for the whole region works out to Rs. 17 per Bigha.

Income from Animal Husbandry.

After 'Cultivation of Land' 'Animal Husbandry' is the most important source of income, the average income being nearly Rs. 73, i. e. 11.5 per cent of the total income. In this connection it is very important to note that the value of the dairy and other products consumed at home by the farmers is not included in this figure. A considerable proportion of these products is consumed by the producers themselves; and hence the real income from this source is, in fact, much larger than this. Again, nearly one-third of this income is mainly from the sale of natural increase in the stock of animals. Further, a considerable proportion of this income is also derived from trade-cum-rearing of camels and bullocks, particularly in the North-West region. Thus, we find that the farmers in the eastern parts of the region specialise in dairying whereas the cultivators in the western areas (being more arid) devote almost equal attention to dairying and animal rearing.

Agricultural Labour

The contribution of wages earned by working in the fields is hardly 3 per cent of the total income. The most important feature of this source is that the proportions are comparatively higher in the eastern regions as compared to the North-west Desert. This is mainly due to the existence of more agricultural labourers and Bhomias side by side in the eastern areas of Central Plains and Submontane region.

Other Services

This is another important source of income to the rural families in Shekhawati, its proportion being about 10 per cent in the total income. It works out to approximately Rs. 10 per head for the whole population of the seven villages. The income from this source is higher in the Central Plains than in the rest of the region due to more persons from the plains being in various services, particularly in the defence forces of the country.

Miscellaneous Sources

This source represents income from all other pursuits. The more important of them are cottage industries and handicrafts, trade in food grains and fodder, plough hire, and transport by camel. Besides, some people also had income from begging, shaving, subletting of agricultural land, interest on loans, and the like. In this connection, it is very important to note that the total income under this head also includes an income of about Rs. 6,000 from trade elsewhere in the country. Thus, this residual source as a whole accounts for about 12 per cent of the total income. The highest proportion is shown in the North-west Desert mainly due to greater income from trade.

III

Expenditure Pattern

Out of the 358 families studied intensively, data on annual expenditure could be collected only in respect of 288 families. For the reasons given in the preceding section, we have chosen to study the expenditure pattern of rural families by taking family as the unit. Again, as the variations in expenditure are not very significant from one region to another, we will confine only to a general study of the family budgets in Shekhawati as a whole.

Data on expenditure were collected under twelve broad divisions, but for the purpose of this section expenditure has been grouped under seven broad categories. The following table shows the average expenditure per family under these categories:

Items of Expenditure	Amount Rs. As. P.	Percentage to total expenditure
1. Food	452-15- 5	59.2
2. Clothing and Footwear	124- 9- 8	16.2
3. Housing	53- 1-10	7.0
4. Fuel & Light (Purchased)	7- 1- 7	1.0
5. Education, Medicines, etc.	11- 4- 2	1.4
6. Social & Conventional needs	92- 7- 3	12.0
7. Miscellaneous Expenses	24- 2- 4	3.2
Total	765-10-3	100.0

The total expenditure per family comes to about Rs. 766 as against the corresponding figure of Rs. 635 for income. Thus, on an average, a rural family has a deficit[3] of Rs. 131.

About 59 per cent of the total expenditure is incurred on food. If the expenditure on social and conventional needs is added to it (most of it being on feasts and ceremonies) the percentage works out to 71. This clearly proves Engle's Law of consumption. In families of lower income groups, the proportion of money spent on food was even higher than the average figures shown in the foregoing table. Expenditure on clothing and footwear is nearly 16 per cent while the corresponding figures for Fuel and light, and Education and Medicine are only 1 and 1.4 respectively. The Miscellaneous group accounts for 3.2 per cent of the total expenditure of the family.

3. It was made good by borrowing. That is why majority of the farmers were found in debt at the time of this enquiry.

Expenditure on Food

The following statement shows the details of expenditure on food under the various sub-heads :—

Item	Amount Rs.	As.	P.	Percentage to total expenditure on food
1. Cereals (Bajra, Barley, Jowar, etc.)	316	3	2	69.9
2. Pulses (Moong, Moth, Chaula, etc.)	36	7	10	8.0
3. Ghee, Oil, etc. (Purchased)	19	5	0	4.3
4. Meat	3	1	4	0.7
5. Vegetables and Spices	24	2	3	5.3
6. Sugar, Gur, etc.	19	4	6	4.2
7. Miscellaneous	34	7	4	7.6
Total	452	15	5	100.0

It is clear from the above table that, of the total amount of about Rs. 453 spent on food-stuffs, nearly 78 per cent was spent on cereals and pulses alone. This shows how very little was left for other nutritive foodstuffs. Bajra and Barley are the staple food of the people here. Pulses, particularly Moth and Gram, are also consumed as cereals in this region. From our observations in the villages we find that Bajra and Moth are more common in the western parts of the region while barley and gram are consumed in greater quantity in the South-eastern part of the region. Rice and wheat are consumed only on special occasions.

The proportion of fat obtained from outside was only 4.3 per cent of the total expenditure on food. The til oil is consumed mostly by farm labour families, particularly Chamars. Ghee is purchased generally for special occasions, such as ceremonies, festivals and the like. The comsumption of meat is almost insignificant mainly because most of the farmers are vegetarians. It is only on certain special occasions that some meat is cooked by a few Rajput and jat families. Further, expenditure on vegetables and spices is also not very high, only 5.3 per cent. Onions, green chillies and potatoes are the most important items which are sometimes purchased by the farmers. Besides, they also consume the natural fruits of 'Janti' and 'kair' as vegetables. During the rainy seasons, plenty of vegetables are had from their own fields. During the winter and summer seasons dried vegetables and *lassi* (butter milk) are consumed in large quantities.

The consumption of *Sugar* accounts for 4,2 per cent of the total expenditure on food. Most of this expenditure is incurred on *Gur* and *Shakkar*. The consumption of crystal sugar is extremely small in the rural areas of Shekhawati. It is used only for preparing sweets on the occasion of marriages or *Nuktas*. The poorer sections of the rural people consume mostly Gur while *Shakkar* is used by villagers of better means. A few families also consume a little quantity of *Khandsari* Sugar.

Thus, the expenditure on food as a whole is not well-balanced from nutritive point of view. The proportion of protective items of food, such as vegetables, fruits, eggs, meat and the like is extremely small. The only reassuring feature is the consumption of dairy products but that, too, is much below the standard consumption for the country as a whole.

Clothing and Footwear

The expenditure on clothing and footwear was Rs. 124-9-8 per family. It works out to 16.2 percent of the total expenditure. Though the proportion is fairly high, it should not be taken to indicate a satisfactory state of affairs in the matter of clothing. Nearly, three-fourth of this expenditure is on women's clothing and footwear which are the costliest items in this group. Besides, this item also includes expenditure on clothing for ceremonial occasions and bedding. Most of the farmers remain almost half-naked. Dhoti, deshi shoes and turban are the most important items in general use. The children under about 10 years usually wear no more than a clumsy shirt of coarse cloth. As regards ladies' wear, though the expenditure incurred is pretty high, the quality and the standard is generally poor. They use only dyed cloth for all the articles of dress.

Housing

About 7 per cent of the total expenditure is incurred on repairs and main-

tenance of the houses. This item also includes expenditure incurred on new constructions of Kachcha houses. During the course of our survey we had collected comprehensive data on housing. The table below will enable us to know the condition of housing in the three natural regions of Shekhawati —

Housing conditions in Shekhawati

(Floor space in Sq. Ft. per head)

Type of Houses	North-West Desert	Central Plains	Submontane region	Average (All regions)
1. Pucca	30.01	17.4	10.9	22.8
2. Semi-Pucca	13.2	20.5	0.9	13.5
3. Kachcha	57.3	45.5	68.7	53.7
4. Cottages	2.6	3.0	8.9	4.8
All types	103.2	86.4	89.4	94.8

The floor space per head comes to 94.8 sq. ft. As one proceeds from North-west to South-east direction, the space per head diminishes considerably. This is mainly due to the poor financial condition of the farmers in the eastern parts. Again, the quality of constructions also deteriorates as we go from west to east. Thus, the floor space per head of pucca houses decreases considerably in the eastern regions of Shekhawati. The proportion of Kachcha (mud) houses is notably higher in the submontane areas as compared to the rest of the region under study.

In this connection it is very significant to note that the houses have practically no ventilation (particularly the kachcha ones) and the plinth is invariably in level with the nearby ground. Even the pucca houses are of a crude type with very little ventilation and low plinth. Thus, we find that, though the total floor space per head is fairly adequate, the quality of accommodation is far from satisfactory.

Fuel and light

The expenditure on fuel and light is just one per cent of the total expenditure mainly because farmers do not purchase any fuel. The expenses on lighting are incurred, on an average, at the rate of about annas eight per family per month, mostly for purchase of kerosene oil and match-boxes.

Education and Medicines

A little over one per cent is spent on education and medicines. This accounts for the lamentable state of education in the rural areas. The expenditure on medicines is incurred mostly on the purchase of *deshi* stuff from the *vaids* who exploit the illiterate people in the villages.

Social and Conventional needs

The poverty-stricken peasant suffers from the age-old traditions and customs which are responsible for a wasteful expenditure of the order of 12 percent of the total income. Tobacco is one of the important items of this group. Roughly about Rs. 4 per adult male member in the family are spent annually on this item alone. Heavy expenditure on various ceremonies, such as betrothals, marriages, etc., is another very important item in this group. A reference has already been made in the preceding pages to the wasteful expenditure for

celebrating *Nuktas* on the death of elder persons in the family. Thus, the accumulation of indebtedness is considerably accelerated by these customs and conventions.

To conclude, the low levels of income accompanied by a some-what improvident spending are primarily responsible for an appallingly low standard of living in rural Shekhawati.

PRODUCER'S SHARE IN CONSUMER'S PRICE OF GUR IN MANDIES OF WESTERN U. P.

By: Dr. J. S. GARG & M. P. AZAD

Introduction

THE manufacture of gur has been an important cottage industry and a regular feature in India from time immemorial. It is manufactured from different raw materials like palm, date and sugarcane but the last one is the main source. It has been estimated that on an average about 3 to 6 million tons of gur is manufactured from 60 to 65% of the cane produced in the country. Although the expansion of sugar industry has adversely affected its production, it still occupies an important place in the rural economy. This industry is of great importance in the localities which are not covered by sugar factories, because the farmers there, are left with no option than to convert the cane into gur. The limited capacity of the factories, the crushing season, and inadequate means of transport and communication are mainly responsible for its existence in the country.

Production and Utilization of sugarcane– Here it becomes necessary to throw light on the production and utilisation of sugarcane because it is the main source of raw material for the manufacturing of gur.

In the matter of sugarcane production, U. P. occupies the most important place having 52.19% of the total area in the country during the year 1956–57. It accounts for almost half the total production of cane. During the year 1956–57 its area and production in terms of gur in the state were 3049000 acres and 3478000 tons respectively. It has bean estimated that its area has increased from 2965000 acres to 3049000 that is by 2.8% and that the production from 31690000 to 35681000 tons that is by 12.58% from 1951-52 to 1956–57.

Meerut and Muzaffarnagar are the chief sugarcane producing districts of U. P. Out of the total cultivated area in these districts, Sugarcane occupies nearly 26% and 15% respectively, and both together, 17.8% of the total area under sugarcane in U. P.

It is mainly utilized in the form of gur, crystal sugar and khand. A very small proportion of it, is utilized for chewing and other home consumption.

Table 1.

Showing the utilisation of sugar–cane in U. P.

Year	Total production of cane in (000) tons.	Cane in form of sugar in tons.	In form of khand in tons	In form of gur in (000) tons.	% of gur out of total production of cane.
1951–52	31690	8999960	80300	1571	49.57
52–53	26510	7173606	80300	1321	49.83
53–54	20732	5659836	80000	998	48.14
54–55	28277	9345548	90000	1232	43.43
55–56	28430	10183626	80000	1177	41.39
56–57	35681	11774730	74000	1722	48.21

During the year 1956-57, the production of gur in the state was 1.7 million tons. On an average the annual consumption of gur is estimated to be about 1 million tons, leaving a surplus of about 7 lakh tons to be exported to the other States of the country. The important importing States are Punjab, Rajasthan, Madras, Bengal, Patiala, Bikaner, Bihar etc. About 11% of the total production of gur in U. P. is detained for home consumption and the balance 89% is marketed.

Marketing of Our : On account of inadequate storage facilities, bargaining power of the farmer and immediate urgent requirement of money, the farmer is compelled to dispose of gur during crushing season. The arrival of gur in the market begins from the month of October and continues till March/April. The price of gur varies from month to month and season to season, depending not only upon the supply and demand but also on the quality and shape of gur.

Table 2.

Showing the monthwise arrivals and prices of gur in U. P. (1957-58)

Month	Hapur Mandi (1957-58)		Meerut Mandi (1954-55)		Muzaffarnagar Mandi (1957-58)	
	arrivals in mds.	Price in Rs. per md.	arrivals in mds.	Price in Rs. per md.	arrivals in mds.	Price in Rs. per md.
Oct.	21080	16.31	112104	14.00	1190	15.00
Nov.	135600	14.47	598070	10.31	199060	15.50
Dec.	1122202	12.67	499567	10.31	238000	14.75
Jan.	74692	11.67	253087	9.75	173000	14.00
Feb.	—	—	293287	8.50	107000	14.25
Mar.	30473	15.06	233466	9.50	103500	16.00
Apr.	—	15.25	218835	9.75	49000	14.75
May	3658	16.05	14748	10.56	13180	13.00
June	2430	19.13	I00581	12.02	4745	14.50
July	nil	21.69	93530	12.25	450	14.50
Aug.	nil	21.90	30460	13.00	nil	15.00
Sept.	nil	22.00	44611	12.62	nil	15.25

November and December are the peak months for the arrivals, being 43.5% and 46.2% of the total arrivals of the year at Meerut and Muzaffarnagar mandies respectively. The arrivals in the month of January and February are fairly large but they show a decline trend afterwards, being lowest from July to September.

The price varies inversely with the arrivals being the highest at Rs. 22,00 per md. at Hapur in the month of September and the lowest at Rs. 12.67 in the month of December with an exception of January. It shows a upward trend of prices from the month of March to September.

Marketing Charges. In the handling of gur, the common marketing functionaries are :

1. Kachcha Arhatiya.
2. Pucca arhatiya.
3. Dalal or broker.
4. Palledar.
5. Tola or weighman.
6. Miscellaneous (a) Menials-sweeper, waterman. (b) Charity, Dharmada, Gaushala etc.

Marketing Charges are divided into two categories.

1. Charges paid by the producer.
2. Charges paid by the purchaser.

Table 3.

Showing marketing charges paid by the producer at Meerut and Muzaffarnagar mandies in U. P.

Unit : One cart load of gur weighing 20 mds.

Market rate of gur : Re. 10/- per maund.

Distance : 8 miles from the market.

Charges	Meerut Mandi Rate	Amount in Rs.	Muzaffarnagar Mandi Rate	Amount in Rs.
1. Transport	-/4/- per md.	5/-	-/4/- per md.	5/-
2. Octroi duty	-/4/- per cart	-/4/-	-/4/- per cart	-/4/-
3. Arhat including other charges	-/7/6 per 100	-/15/-	1/8 per 100	3/-
4. Dharmada	-/-/6 per 100	-/1/-	-/4/- per cart	-/4/-
5. Association & Gaushala	-/-/9 per 100	-/1/6	——	—
6. Misc.	4 chh per cart	-/2/6	——	—
Total		6/8		8/8
Charges per maund		-/5/3 or 33 Np.		42 Np.

Table 4.

Showing the marketing charges paid by the purchaser at Meerut & Kanpur Mandies.

Charges	Meerut Mandi Rate	Amount in Rs.	Muzaffarnagar Mandies Rate	Amount in Rs.
Arhat	2/5 per 100 Rs.	4/10	-/-3 per rupee	3/2
Palledari & filler.	-/1/3 per bag	-/10/-	-/1/3 per bag	-/10-
Dharmada & Asson.	-/-/9 per 100 Rs.	-/1/6	-	-
Material Bora etc.	25% of the cost value.	1/3/6	25% of cost value.	1/3/6
Total		6/9		4/15/9
Charges per maund.		-/5/3 or 33 np.		-/4/- or 25 np.

The marketing charges differ from mandies to mandies. The charges paid by the producer are 33 np. and 42 np. per maund and those by the purchaser are 33 np. and 25 np. at Meerut and Muzaffarnagar mandies respectively. Local conditions and customs are responsible for these variations.

Producer's share in consumer's price:- The term indicates the share of the producer in the price, paid by the consumer in a particular mandi for a particular commodity. It also gives an idea of the share of the middleman and charges incurred in transport and communication. This is affected by the distance from producing to consuming centre and number of times, the commodity exchanges hands, before reaching the consumers.

A case study of producer's share in consumer's price, conducted by the writer himself, during the year 1955-56 is given below. The commodity was first sold at Meerut Mandi and retransported by rail to Kanpur Market.

PRODUCER'S SHARE IN CONSUMER'S PRICE OF GUR IN MANDIES

Mandi :	Meerut.
Producing centre.	8 miles from the market.
Unit	1 cart of 20 maunds gur.
Market rate	Rs. 10/- per maund.

Item	Amount in Rs. per maund.	% of the consumer's price
1. Marketing charges paid by the producer Meerut Mandi	-/1/3	0.55
2. Net price received by the producers.	9/14/9	70.8
3. Buyer's cost price at Meerut	10/-	71.35
4. Charges paid by the buyer at Meerut	-/5/3	2.34
5. Price at which gur exported from Meerut.	10/5/3	73.69
6. Railway fair to Kanpur	-/12/5	5.54
7. Misc. expenses at railway Stn.	-/2/-	0.59
8. Marketing charges at Kanpur	-/7/4	3.37
9. Profit of wholsale purchaser	1/-/3	7.25
10. Retailer's purchase price at Kanpur.	12/11/3	90.74
11. Retailer's profit	1/4/9	9.26
12. Retailer's sale price or consumer's purchase price	14/-	100%

The producer's share comes to 70.8% of the price paid by the consumers at Kanpur Mandi. The remaining 29.2% of the price is distributed among different functionaries and transport agencies.

Conclusion: The importance of marketing of gur cannot be over emphasised. Since it is not possible to convert the whole sugar cane crop of the country into crystal sugar, the manufacture of gur will continue to occupy the most important industry. Besides increasing out-turn per acre of cane and improving the quality of gur, it is very essential that its storage and marketing should also catch the attention of all concerned. Gradation and standardisation should also form an important part in its marketing.

The introduction of co-operative marketing and system of ware-housing are bound to play an effective role in increasing the producer's share in consumer's price. The Government is fully aware of the problems of gur manufacturing and its marketing. Some effective steps have already been taken by the State Govt. by initiating a Gur Development Department, in the State under the Ministry of Industry. The marketing department at the Centre and State have also been looking keenly at the marketing and storage problems and it is expected that soon some effective solution will be at hand. The etabilisation of price in relation to cost of production and parity prices of different commodities will help the producers in securing better prices for their product. The consumers will also get good quality produded at reasonable price, if effective steps are taken by the Goverment in developing this industry.

VEGETABLE GROWING

By : H. M. DESAI

(Continued from March 1960 issue)

B. Improvement in the technique of cultivation

IMPROVEMENTS in yield and in quality of the produce, without proportionately increasing the cost of cultivation can mostly be achieved by improving seed quality by breeding and improving the technique of conventional methods of cultivation.

Successful results of improvement work carried out on Government farms and incorporated in the routine of cultivation of garden crops are discussed below under the following heads.

Seeds and Varieties :—As a result of experimentation and testing trials the following varieties of vegetable crops are recommended for cultivation on a general scale.

Guwar : Makhania and Pardeshi Varieties.

Beans : Early variety-French beans.

Intermediate variety :—Lima beans.

Late variety :—Double beans.

Brinjals : Purple variety from Surat.

Tomato : Donny best.

Cabbage : Drum head.

Cauliflower : Snow ball.

Potato : Italian and numbri variety from Simla.

Turmeric : Soni for curing purpose. Lokhandi for Kachumbar (green raw use).

Kareli : White variety from Surat.

Cultural :—The recent view of scientific management of soils is firstly to devolop land as an anti-erosionary precautionary measure. After securing land against erosion it should be laid out for planting in such a way as to preserve the soil structure as a best home for plants to grow and to thrive against irrigation.

In the heavier soils of clay loam types there is a tendency to form a crust on the top of the soil after each irrigation in our traditional way of farming. This top crust goes on increasing to a greater depth under subsequent irrigations. The stirring of soil as an intercultivation measure does not help to preserve the soil structure to a desired consistency.

This was observed on the Agricultural College farm soils while growing root crops like potatoes, suran-ginger etc. which did not do well when grown by traditional bed method of the lay out of land for raising of these crops.

The study of the habit of growth of these crops indicated that, the bed method did not provide soil conditions for the optimum growth of these crops especially in the period when they were developing. These observations suggested, that, for optimum growth of these crops the method of lay out of land should be suitably changed. After trials the broad ridge method of layout was evolved. In this method soil remained in good heart throughout the growing period of these crops. The ridges with flat topswere prepared three feet wide with a two feet furrow for irrigation between them. The length of the furrow depends upon the slope of the land and as a rule should be as long as practicable.

Irrigation—In the local bed method of cultivation irrigation water is let into each bed by flooding, and when bed is filled, the water is diverted to another bed and so on. By this method of irriga-

tion water came in direct touch with surface soil and damaged its granules. As a result, after subsequent irrigations the surface soil puddled and on drying it set hard and cracked. The growing crop did not adjust to these changes in structure after each irrigation. The result was restricted development of crops growing therein. In the broad ridge method of lay out water was allowed to run into the furrow slowly, and these were filled upto the top while the broad ridge absorbed water by percolation. In this method the difficulty of soil puddling is the least. The water only comes into contact with the soil in the furrows and these can be safely stirred without danger. This method is in routine practice on the Agricultural College Farm, Poona, for the last 25 years. The crops like ginger which were a failure on the College Farm grew successfully by this method and crops like suran, potatoes, tumeric etc. gave increased yield by 50 to 60% over the local method of planting.

(For various methods of irrigation please refer to bulletins No. 135 of 1927, 182 and 183 of 1939, of the Bombay Department of Agriculture, Poona.)

After—tillage operations—Root and tuber crops are benefitted by the earthing up operation. In the broad ridge method the furrows can be dug out periodically and soil spread on the broad ridge which provides good earthing up operation.

Manuring—In the local method, basic doze of organic manure is given which is supplemented by a top dressing of oil cake manure. As a result of experiment and trials, the Bombay Department of Agriculture recommends the following dozes of manures :

Name of the crop	Organic manure in cartloads per acre	cake lbs. per acre		Top dressing in lbs per acre sulphate of ammonia	super-phosphate	(Sulphate of potash)
1. Leafy vegetables	20	600–800		160–200	—	—
2. Cabbage family	20	600–800				
		or 300–400	+	75–100	150–200	—
3. Tomatoes	20	500–600				
		or 250–300	+	60–75	—	—
4. Brinjals	20	800–1000				
		or 400–500	+	100–125	—	—
5. Bhindi	20	200–300		—	—	—
6. Cucurbits	20	200–250				
		or 100–125	+	25–30	—	—
7. Beans	10	—		—	100	—
8. Carrots, beets etc.	20	300–400				
		or 150–200	+	40–50	40–50	—
9. Suran, Ginger etc.	30	1000–1200				
		or 500–600	+	125–150	—	—
10. Onions	20–30	400–600		200	100	50
11. Potatoes	30–40	300–400	+	100–120		
				or 75–100	80–100	100–150
12. Sweet Potatoes	20	400–600		—	—	—
13. Chillies	20	400–600	+	60-100	80–100	40–80

Top dressings are given in two dozes: (1) three weeks after planting and (2) 3 to 4 weeks after the first doze.

Control of pests and diseases—There are a number of insect pests and plant diseases which commonly affect vegetable crops and unless controlled, cause much damage and loss to the grower.

Pests may be divided into two distinct classes. Those that eat part or parts of plants and those that suck juice out of plant. For biting or eating insects stomach poisons and for sucking insects contact poisons are effective measures.

The main pests and diseases on vegetable crops are dealt with below:

Cut worms. These insects generally appear in vegetable beds or fields at the early stage of growth of the crop. They live in soil during day time and only appear at night when they cut down the tender young plants at the ground level. They are stout, smooth, cylindrical caterpillars, greenish black in colour and about an inch and a half in length when fully grown. When disturbed they coil their bodies. These are generally found singly near the plant in the surface soil. The best remedial measure is to dig up the soil round about the cut plants and destroy the caterpillers. Poison baits prepared from 25 parts of wheat bran to one part of white arsenic moistened with water and molasses may be broadcasted in the fields at the rate of 10 to 15 lbs per acre.

Thrips. These insects generally attack onions, peas, chillies crops. They are minute insects yellowish in colour with fringed wings. They are sometimes found in large numbers and cause whitish patches on the leaves. In case of chillies the leaves get curled. They can be controlled by spraying the plant with a tobacco extract prepared by soacking one part (by weight) of tobacco waste (Dhus) in twenty parts of water for 24 hours with frequent stirrings during that period and then adding an equal quantity of water before use.

Aphides. Commonly found on cabbage, cawliflour, knolkhol, peas, mogari, brinjals, potatoes, beans, etc. This pest is very widely distributed. The rate of multiplication being very heavy the spread of the pest is enormous. If early precaution is not taken, inspite of sprayings the pest is uncontrolable. The effective measure against aphides is to spray the crop in time i.e. in the beginning of the pest attack with repeated sprayings of tobacoo extracts.

Mites and Jassides. These attack potatoes, tomatoes, chillies brinjals etc. Against mites sulphur dusting and for jassides spraying with tobacco extract are effective control measures, against these pests.

Beetles. There are various types of beetles which cut holes in the leaves of vegetable crops and may cause much damage. Generally beetles attack crops at night. Dusting the leaves with fine ash mixed with kerosene in the proportion of 2 lbs of former and four ounces of the later is the useful deterent.

Caterpillars. Many caterpillars damage vegetable crops by feeding on leaves. These insects should be dusted or sprayed with stomach poison i. e., lead arsenate (one ounce of well powdered stuff to be dissolved in 4 gallons of water with an ounce of quick lime) or parish green (half an ounce in four gallons of water with one ounce of quick lime) and distroyed.

Red pumpkin beetle. Invariably associated with cucurbit crops especially in

the monsoon season, to be sprayed with stomach poison and distroyed.

Fruit borers. These attack fruit vegetables. The best way to deal with the pest is to remove effected fruits and to destroy them.

Shoot borers. These pests attack shoots of brinjals, tomatoes, potatoes etc. The best way to deal with this pest is to pull out affected shoots with caterpillars and to destroy them.

Note :—As stomach poisons lead arsenate, calcium arsenate, magnesium arsenate, parish green, sodium silicofluocide and preparations like Gamixone and hexaclanecotox are recommended. These are used as dusts or sprays. For spraying, one pound mixed in 50 gallons of water is used. These, however, should not be used against vegetables which are used as raw. For contact poison, nicotine sulphate or powder, pyrethrum, nicotax, preparation of DDT benzene, hexachloride, crude oil emulsion, and many others are available in the market. These should be used according to instructions provided by trade.

Mildew : A fungus disease which damages many vegetable crops (peas, beans, guwar, cucurbits etc.) and which shows as an ashy white deposit on the surface of the leaves. Dusting with fine powder of sulphur is very effective.

Mosaic : A virus disease which causes the leaves and fruits of vegetable crops like tomatoes, beans, bhindi etc. to become moffled and stunted and leaves curled in appearance. The best way is to remove and destroy the affected plants and to avoid using seeds of crops affected on a general scale by the disease.

Ginger rot : This disease in the ginger crop is on the increase. The best way is to select fields and plants which are free from disease for the seed purpose.

9. Harvesting

The usual practice is to harvest crops as they are ready for use. In vegetables tenderness is valued. In the market, if customers are indifferent to the quality and prefer cheapness, farmers harvest vegetables when in maximum weight i.e. when tender stage is passed. For leafy vegetables in the Surat market customers prefer very tender plants 4 to 6 inches in height and pay price for the same. In the Poona market customers prefer plants fully matured in the flowering stage as they get a big bundle at a small price. They do not mind a little bitterness which develops at that stage.

In vegetables like brinjals some of the customers want fruits in soft seed stage while others prefer fully matured hard fruits.

In cabbage family in some markets compact heads are favoured while in others fully developed heads also find ready sale.

Accordingly, growers are indifferent in their harvesting practices when customers are not sensitive to quality. When produce of one market goes to the other where quality is prefered such produce do not find sale and remain unsold. It was our experience that when our produce was sent to Bombay from Poona the same did not find ready market and often remained unsold.

There are no standards and grades in vegetable marketing and hence the growers are not encouraged to grow quality produce for the market for better prices. The vegetable seller does some sorting and arranging in his sale-stall for attracting customers which is only a very poor show substitute for grading.

10. Marketing

In the local markets, vegetables are sold on weight, number or on dozen basis. In the Poona market, for example, a maund is of 32 pounds with 4 pounds extra weight for driage—shrinkage etc. A shenkada is 128 and a dozen of 12 by number.

Crops like cluster beans, chillies, brinjals, sweet potatoes, onions, garlic, beans, peas etc. are sold wholesale by weight. Cabbage, knolkhol and maize cobs are sold by dozens. Leafy vegetables bundles are sold by shenkda, Bhendi, cucurbits etc. are sold in heaps by auction without any particular reference to weight or measure. Tomatoes are auctioned by baskets. Retailers sell all the vegetables by weight except the cabbage family crops which are sold by number. Leafy vegetables are sold by bundles.

Usually in the Poona market a grower on an average realises 43 to 50% and the truck crops like suran, about 60 to 70% of the retail price.

Whole sale price in the Bombay market is undependable. There are a lot of fluctuations in the retail market depending upon supply and demand on any particular day. In the monsoon season, on wet days etc. the vegetables sell at higher price. Generally in the hot season and at the commencement of the cold season the supply of vegetable is less. On holidays especially in the Christmas week prices are a bit higher. Growers do not store parishable vegetables. Truck crops like potatoes, suran and onions are stored by well-to-do farmers in order to realise better prices later on.

Bombay Agricultural Department carried out some experiments in storing of potatoes. No improved method is yet recommended by the Agricultural Department for general use in the place of the local method in use.

There is no co-operation in the vegetable market between the growers, vendors and customers to raise the standard of both production and to raise customer's taste for vegetables.

There are Co-operative Organisations of vegetable growers recently developed. They purchase seeds like potatoes and undertake marketing of the produce in bulk for the members. These organisations being of recent development have not yet interested themselves in enhancing the vegetable production with a view to serve the public with quality vegetable of different varieties with restricted profit motive. This can only be achieved if there is a small scale side industry for processing of seasonal surpluses of vegetables of below quality standard.

There is a great scope for establishing home and small village industries for processing and manufacturing of seasonal surpluses for off time use in the scarcity periods both in the rural and urban areas. Under our conditions only the State can take the initiative through the co-operative organisations.

11. Cropping systesm

These include crop management methods of rotations, mixtures, inter or companion cropping etc.

Rotation of crops. Succession of crops one after the other. The crop may be of the same or different orders having different growing requirements and are known as competing crops. Heavy feeding exhaustive crops should be followed by light feeding crops. Deep-rooted should be followed by shallow crops and so on. In a rotation it is advisable to include a legume crop. The duration of a rotation depends upon the type of the soil. On heavy soils a dry crop requiring no irrigation should be included once in two years. On lighter soils a dry crop once in three to four years will suffice. A crop requiring irrigation over a long period of time should be followed by a seasonal crop requiring very few irrigations.

Succession of crops: Growing of one crop after the other in rapid succession over the number of seasons under intensive system of cultivation. This is usually practised near big cities where land is costly with restricted irrigation. This requires management practices of very high order.

Companion crops and intercropping: This refers to cropping system in which rows of early crops are grown between a row of late crops. For example between cabbages crops like knolkhol, lettuce etc. are planted. Between cucurbits and cucumbers early crops which occupy land for a short period leaving land free when the main crop is in growth are planted. In this system of cropping great care is exercised in selecting crops for growing in between the main crop.

Partnership crops: Two crops occupy the same land throughout the season. In a suran crop, a crop of yam is grown or crops like cabbage and cauliflower are grown.

Mixture cropping: This is a highly developed system in which a good few crops are grown together. For example, in a cabbage field cauliflower, knolkhol, lettuce and beet roots are grown. In a suran crop, ginger, yams, brinjals and chillies are grown. This type of cropping requires very intensive system of cultivation requiring high skill in selection of crops in a mixture and assigning definite place to each so that all the factors of growth harmonise. Vegetable growers near city centres, have developed vegetable growing to a fine art. They select their own seed and by experience have developed very intensive system of soil management and crop husbandry is which profitable yields are obtained by keeping soil in good fertility status. Only weak point in the prevailing husbandry methods of intensive vegetable culture is the absence of modern control measures against pests and diseases. It is true, that either pests or diseases seldom appear in plague form. But whatever ravages do occur are neither promptly nor efficiently controlled. Vegetable growers are now maintaining dusting and spraying equipment with medicines, but the control measures are not yet carried to efficiency that is expected of the professional vegetable growers.

Special methods: The special methods of growing vegetables for more profit under controlled conditions like cold

frames, hot beds, glass houses etc., that are developed in foreign countries, are not yet even thought of in this country. The reasons are many but the chief one is, that, under the varying environmental conditions of our country vegetables are available all the year round either in one part of the country or the other and those who could afford can get fresh vegetables all the year round if they can pay for it. In the rural areas both cultivated and uncultivated vegetables are available for the most part of the year either from fields or uncultivated lands only for the labour of collecting these. Moreover, economic conditions of most of our population will not allow purchase of vegetables grown under special conditions with very high costs.

12. Cost of Raising Crops

It is not possible to give average figures of cost of cultivation to suit all conditions under which vegetable farming is carried out. Group of farmers and their conditions of farming vary considerably. A farmer may be a manager farmer or an owner farmer or a tenant farmer or a share cropper. There may be innumerable variations of varying nature among each of these groups. Environmental conditions of farming also vary considerably in the various agricultural tracts. Distance from the central market place may be also varying. All these innumerable ultimately reflect in the cost of production.

In the cost of cultivation, various items of expenditure shall have to be included. Some of these might have used material from the home stock for which no actual cash expenditure might have been incurred. In calculating full cost, the expenditure on these items shall have to be estimated. For example the owner farmer may not have to pay in cash for the use of land except the Government assessment, while a tenant farmer may have to pay cash rental or fixed shere of the produce. Manure may be home produced or purchased. To avoid all these complications it is suggested that in calculating cost of cultivation all items of expenditure should be included as is done in a commercial undertaking. From the expenditure statement any body should be able to work out cost of cultivation under his conditions. The expenditure and receipt statements should be prepared for the whole enterprise from which proportionate cost of cultivation for each individual crop if necessary may be worked out.

The following procedure is suggested to workout the expenditure statement:—

1. Cash expenditure statement

A. Upkeep and maintenance of bullocks. (Cash expenditure on feeding—average yearly interest on the purchase price of bullocks and depreciation at 10%).

B. Labour charges (only on hired labour)

D. Seed charges (Seed purchased)

C. Manure charges (purchased manure and fertilisers)

E. Charges for implements used. (Interest on outlay and depreciation to be included)

F. Medicine charges (Pests and diseases control)

G. Irrigation charges (Cash payment or if share, the value to be estimated at bazar price)

H. Interest on capital and yearly expenditure. (at 9% for recurring cash expenditure of the year only half the amount is to be calculated as the expenditure is spread over the whole year)

2. Receipt statement

A. Money value realised from cash sale.

B. Estimates of value of produce used (1) in farming and (2) for home use of farmers.

3. Income

A. Farm income.

By deducting cash expenditure from cash realisation the resulting surplus is known as farm income.

B. Family income.

By deducting assessment or rental or share from the produce as the case may be, the resulting surplus is family income

C. Profit.

If from the family income the wages for the family labour used in farming are deducted the result is profit or the amount left is remuneration for personal supervision.

4. If farming is carried only by managerial system, all the expenditure items will be deducted from the receipts and balance left is profit on investment and may be worked on percentage basis as is done in a business concern.

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